

Technical Collaboration Board Meeting Summary

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Will single and large grain materials provide cost reduction and performance benefits for ILC ?

(Final answer: maybe)

- Eliminates many steps in sheet material production which raise cost and introduce impurities.
 - One cost analysis done by DESY shows forging, rolling and annealing steps introduce about 20% in final sheet cost.
 - But ingot cutting costs are still high and need to be studied. Both JLAB and FNAL have acquired EDM cutting machines.
- May eliminate need for EP.
 - BCP treatment is mirror smooth
- Several Nb producing companies are involved. CBMM, NinXia, Wah Chang and Heraeus.
 - There is no company that can produce a single grain ingot.
 - One company can produce grains 7" in diameter
 - All these companies are trying to produce larger single crystal ingots

Million Dollar Question

Should the world cavity community purchase a single crystal ingot cavities to divide amongst three regions?

Answer : Not Yet

- JLAB already has purchased ingots of large grain material
- We should re-visit this question if and when a large diameter single-crystal ingot is available.
- In the meantime many labs within SMTF are working on large grain material cavities.
- Notes
- Tests show that ultimate gradient is not higher than polycrystal, but there is promise of better reproducibility because of fewer or simpler steps.
- Grain boundaries in large grain ingots could still limit ultimate performance.

How aggressively should the ILC community pursue “revolutionary” approaches for cost reduction?

- Bob Kephart made a nice summary of several approaches to consider
- For cavities:
 - hydroforming, spinning, inert gas welding with tig or laser
- Many approaches have been tried and are still being tried, e.g. at DESY, INFN...
- DESY cost analysis shows that after major reductions (x 5) in cavity costs after reducing welding costs by load-lock systems, the major fraction (> 75%) of cavity cost is now in machining and stamping..
- End-group costs still dominate cavity costs. These do not go down by above methods
- Recommendations:
 - It is worth re-visiting some techniques with large grain and single crystal.
 - Encourage SBIR vehicles
 - Inert gas welding not recommended: gas is never as pure as vacuum.

- Cryomodule
 - Reduce touch labor
 - Eliminate bolted connections labor intensive and dirty
 - Wireless Instrumentation feeds .
- Should incorporate lessons from modern magnet cryomodule production.
- These approaches will be discussed under WG2 and its continuation at TTC (hopefully !)